

ADAPTING SALT CREEK PUPFISH (*CYPRINODON SALINUS*) TO FRESH WATER

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ABSTRACT.—The Salt Creek pupfish, *Cyprinodon salinus*, is adapted to fresh water in aquaria.

The Salt Creek pupfish, *Cyprinodon salinus* is endemic to Salt Creek, a short, 2 km, spring-fed stream located at about 70 m below sea level on the floor of Death Valley, Inyo County, California. Although this cyprinodont was first described as a separate species by Miller (1943), it appears only infrequently in the subsequent literature (Burley 1978, Brown and Feldmeth 1971, Hunt 1975, LaBounty and Deacon 1972, Miller 1948, Miller 1968, Soltz and Naiman 1978).

To obtain specimens for a study of social behavior, twelve *C. salinus* were taken from Salt Creek on 30 September 1980. The fish, which ranged in size from 15 to 35 mm, were captured with dip nets from open waters near the banks of the first small pool below McLean Spring and from a mud-detritus substrate at the same pool. Water temperature at the time of capture was 17.8 C, and salinity of the water was 20 o/oo. The fish were placed in stream water in a 7.6 liter plastic bucket and transported by backpack, automobile, and airline to the laboratory, where they were placed in a 75 liter aquarium on 2 October 1980.

The water in the aquarium consisted of aged (21 days) tapwater to which had been added enough Instant Ocean[®] synthetic salts to bring the salinity to 20.6 o/oo. The fish accepted a mixed diet of TetraMin Staple Food[®], Tetra Krillflakes[®], and Tetra AlgaeFlakes[®] at 0600 and San Francisco Bay Brand[®] frozen brine shrimp at 1630.

To circumvent problems associated with maintaining fish in saline aquarium environments, I decided to desalinate *C. salinus* and conduct behavioral observations in a freshwater environment. Stuenkel and Hillyard (1978) reported maintaining this species in

freshwater but gave no details or schedule for desalination.

Desalination began on 4 October by the removal of saline aquarium water and the addition of an equal amount of aged (7 days) tapwater. During the desalination sequence, starting from a salinity of 20.6 o/oo, daily salinity was as follows: 17.8, 15.3, 12.7, 10.1, 7.5, 4.8, and 3.4. Throughout this schedule the water temperature was maintained at 20 C.

After six months the fish have shown no adverse effects to the adaptive procedure. In addition, they have spawned repeatedly in this freshwater environment.

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LITERATURE CITED

- BROWN, J. H., AND C. R. FELDMETH. 1979. Evolution in constant and fluctuating environments: thermal tolerance of the desert pupfish (*Cyprinodon*). *Evolution* 25(2):390-398.
- BURLEY, V. J. 1978. Salt Creek nature trail. Death Valley Nat. Hist. Assoc., Calif. 15 pp.
- HUNT, C. B. 1975. Death Valley: geology, ecology, archaeology. Univ. of Calif. Press, Los Angeles. 234 pp.
- LABOUNTY, J. F., AND J. E. DEACON. 1972. *Cyprinodon milleri*, a new species of pupfish (family Cyprinodontidae) from Death Valley, California. *Copeia* 1972(4):769-780.
- MILLER, R. R. 1943. *Cyprinodon salinus*, a new species of fish from Death Valley, California. *Copeia* 1943:69-78.

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- _____. 1948. Pages 86-87 in *The cyprinodont fishes of the Death Valley system of eastern California and southwestern Nevada*. Museum Zool., Univ. of Mich. Misc. Publ. No. 68, Ann Arbor.
- _____. 1968. Records of some native freshwater fishes transplanted into various waters of California, Baja California, and Nevada. *Calif. Fish and Game* 54(3):170-179.
- SOLTZ, D. L., AND R. J. NAIMAN. 1978. The natural history of native fishes in the Death Valley system. *Natl. Hist. Museum, Los Angeles County Sci. Ser.* 30. 76 pp.
- STUENKEL, E. L., AND S. D. HILLYARD. 1978. Page 49 in *Effects of temperature and salinity on electrolyte and energy metabolism in the pupfish, *Cyprinodon salinus**. Proc. 10th Ann. Symp. Desert Fish. Coun.